2514

ORDER NO. SD7702-1194

Service Manual

Direct drive Turntabl System

SL-1800 (X, XAL)
SL-1800A (X)

Notes:

* The models SL-1800(X), SL-1800A(X) are available in Asia, Latin America, Oceania, Middle East and Africa.
* The models SL-1800(XAL) is available in Australia only.

SPECIFICATIONS

(TURNTABLE SECTION)

Type	Direct Drive Turntable system, Manual
Drive method	Direct Drive
Motor	Back Electromotive Force Frequency Generator servo DC motor employing one chip IC
Turntable platter	Aluminum die-cast, 33 cm (13")
Turntable speeds	33-1/3" and 45 r.p.m.
Pitch controls	Individual adjustment controls, 10% Adjustment range
Wow and flutter	0.025% W.R.M.S. (JIS C5521) ±0.035% Weighted zero to peak (DIN 45507)
Rumble	–50 dB (DIN 45539A) –73 dB (DIN 45539B)

(TONEARM SECTION)

Type	Universal tubular arm, staticbalanced type
Effective length	230 mm (9-1/16")
Overhang	15 mm (19/32")
Friction	7 mg (horizontally and vertically)
Effective mass	22 g (6.0 g cartridge weight 1.75 g stylus pressure)
Tracking error angle	Within +3° [at the point of 145 mm(5-45/64") from the center] Within +1 [at the point of 55 mm (2-3/16") from the center]
Offset angle	21.5°
Anjustable stylus pressure range	0 to 3 g (stylus pressure direct reading type)
Cartridge weight range	5 to 11 g
Head shell weight	9.5 g

(Cartridge section)

Type	Moving magnetic stereo cartridge
Frequency response	20 to 25,000 Hz
Output voltage	3.2 mV (1 kHz, 5 cm/s. zero to peak lateral velocity) (4.5 mV 1 kHz, 5 cm/s. zero to peak 45° velocity)
Channel separation	25 dB at 1 kHz
Channel balance	Within 2 dB at 1 kHz
Load impedance	47 kΩ to 100 kΩ
Stylus pressure	1.75 ± 0.25 g
Replacement stylus	EPS-270ED

(GENERAL)

Power supply	~110–120/220–240V, 50/60Hz
Power consumption	6W
Dimensions (H x W x D)	12.5 x 45.3 x 36.9 cm (4-15/16 x 17-12/16 x 14-9/16 inches)
Weight	8.5 kg (18.7 lbs.)

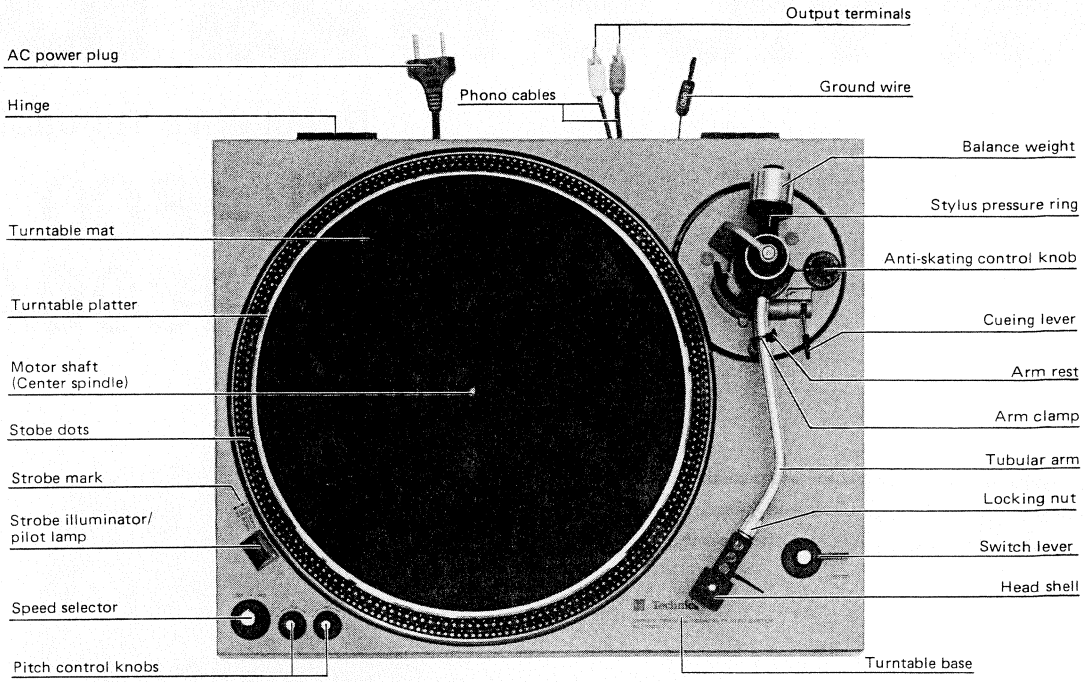
Specifications are subject to change without notice for further improvement.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

2514

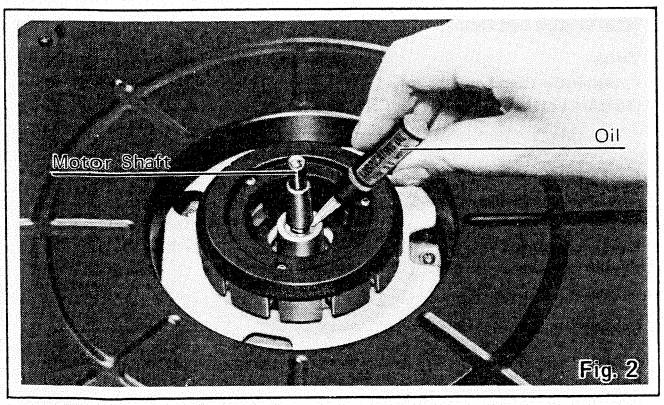
■ Parts identification



■ Assembly and set-up

Apply two or three drops of oil to the motor shaft using the furnished oil container. (See Fig. 2)

Although the unit has been lubricated before shipping from the factory, apply a few drops of oil to the motor shaft for assurance. After that, application of two or three drops of oil once every 2000 hours' operation or so is sufficient. The time interval is much longer than that of the former type motors (200 - 500 hours), so do not apply too much oil, nor more frequently than necessary. Never use any other type of oil.



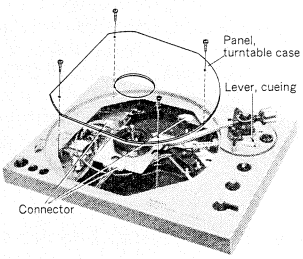
1. Remove the cartrige.
2. Fix the tone arm to the arm rest.
3. Remove the turntable.
4. Turn the player set upside down with good care not to damage the acryl cover.
5. Take off 4 vis-screws from the back panel.
6. Place the player set face upward holding it with both hands so that the body is not separated from the main body.

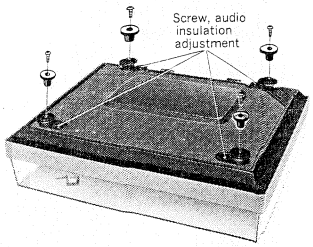
(1) For removal of the cover, take off 4 vis-screws from the panel cover.
(2) Draw out three connectors.
(3) For separation of the body from the main base, turn the cueing lever upward, move the tone-arm in inboard direction, then lift up the body.

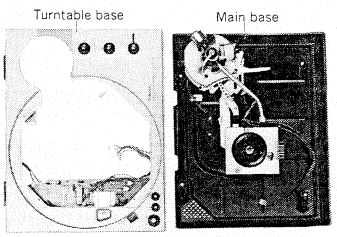
Note:

The turntable horizontaliy to the panel face is already adjusted before shipment.

If deviated, correct it by means of the adjust screws using a 5mm box spanner.







■ Adjustments

Adjustment of the arm lift height (See Figs. 4 and 5)
The arm lift height (distance between the stylus tip and record surface when cueing lever is raised) has been adjusted at the factory before shipping to approximately 5 to 10 mm (3/16" to 25/64").
If the clearance becomes too narrow or too wide because of the physical size of the different cartridges on the market turn the adjustment screw clockwise or counterclockwise, at the same time pushing the arm lift down.

Clockwise ratation
—distance between the record and stylus tip is reduced.

Counterclockwise rotation
—distance between the record and stylus tip increases.

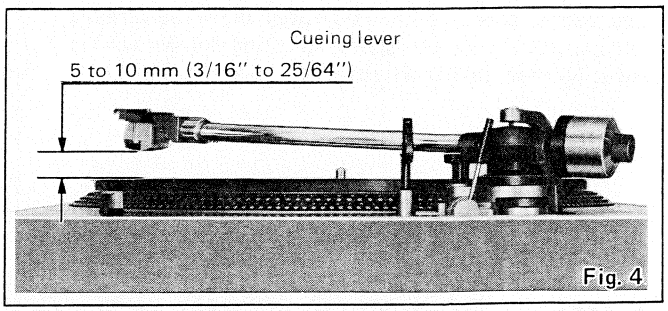


Fig. 4

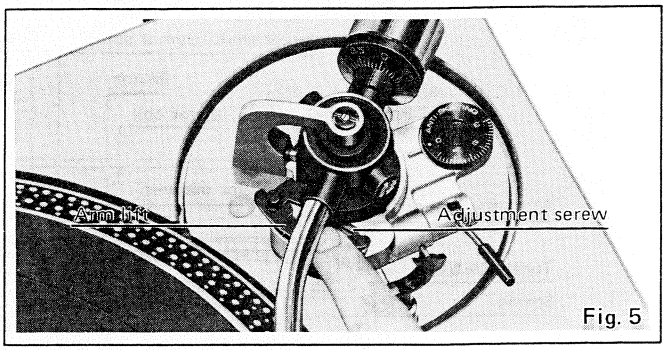


Fig. 5

Speed adjustment (with pitch control knobs) (See Figs. 7, 8 and 9)
Strobe dots are set on the tapered rim of the turntable platter according to the power frequency and the number of revolutions of the records. Make adjustment, referring to strobe dot indication. (See Fig. 7)

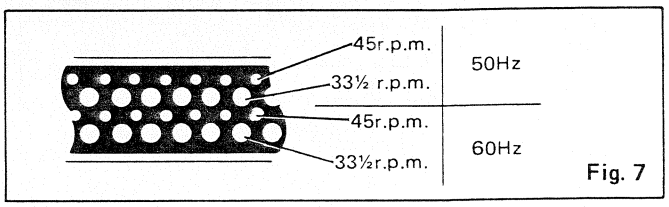


Fig. 7

1. Set the speed selector to the number of revolutions to be adjusted. (See Fig. 8)
2. Release the arm clamp and raise the cueing lever.
3. Move the tonearm to a slight extent towards the turntable platter.
   The strobe illuminator/pilot lamp will be lit for illuminating the strobe dots.
4. While turning the pitch control knobs either to "+" side or "—" side, adjust to such an extent that the strobe dots of the turntable look as if they were stationary.
   The state under which the strobe dots seem to be stationary represents the correct number of revolutions.

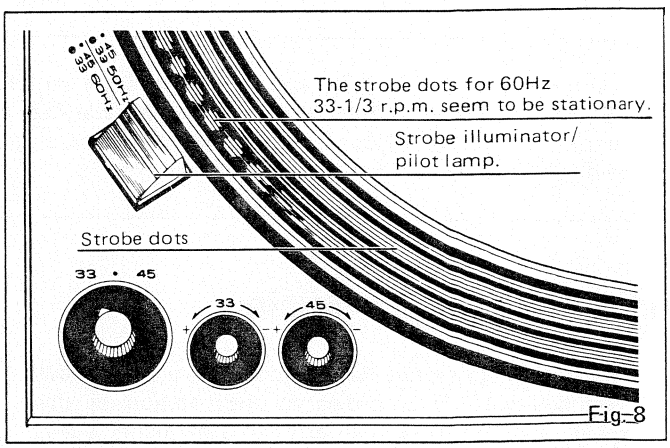


Fig. 8

"+" direction
This increases the speed of the turntable rotation, and the strobe dot pattern seems to flow in the same direction as the rotational direction of the turntable platter.

"—" direction
This decreases the speed of the turntable rotation, resulting in a state opposite to that in the "+" direction.

Note:
Strobe dot pattern.
The strobe illuminator/pilot lamp of this unit employs the commercially available power source. The frequency of such power source, when actually measured, has a fluctuation of about 0.2%. As such a fluctuation of the power source affects the strobe illuminator, the strobe dot pattern also seems to fluctuate to a certain extent.

But the unit is not affected by the fluctuations of the power source, since a D.C. motor is employed.
If the desired speed can not be obtained by the variable pitch controls, turn the speed adjusting screws with a screw driver for further adjustments. (See Fig. 9)

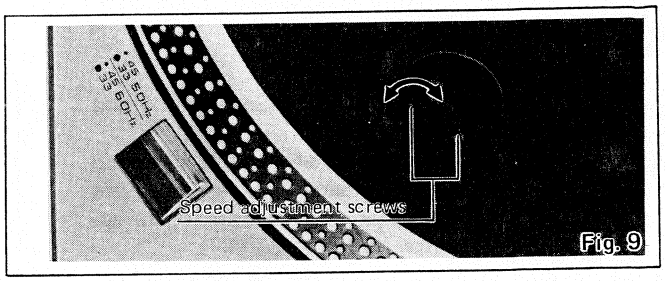
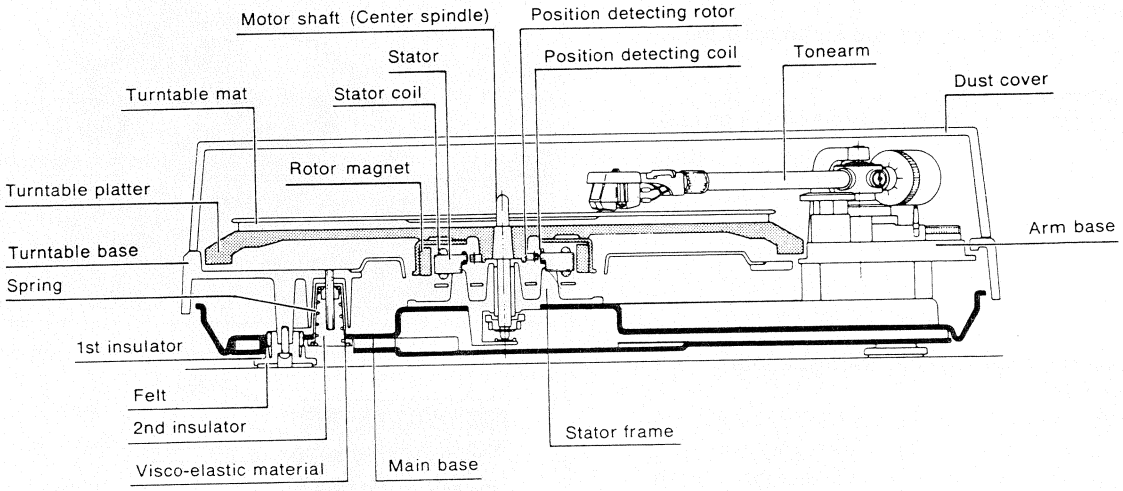


Fig. 9

■ Cross section of motor portion and double insulator



■ Operation principles of the SL-1800

This unit, like the SL 1300 has a rational motor structure, and its drive control circuit is the B.F.G. type (Back TECHNICAL EXPLANATION electromotive force frequency generator) which is constructed on a single integrated circuit (IC) chip (AN630). The following is a block diagram of the IC (AN630) for which the operating principle will be briefly explained.

■ Operating principle

The back electromotive force, which is generated by the drive coil winding according to the rotation of the motor, is detected and converted to a frequency signal that is proportional to the number of revolutions.
Conversion is performed by a wave-shaping circuit and a logic circuit (This is referred to as the B.F.G. method). This frequency signal is compared with a standard signal by means of a frequency-voltage conversion circuit which converts it to a voltage signal in order maintain a constant number of revolutions. After removing unnecessary frequency components, with the operational-amplifier active filter, from this voltage signal, it controls the current flow in three differential switching circuits. As a result, the flow of current in the drive coil winding is always constant maintaining the correct rotational speed. Control of the rotational speed can be performed by means of adjusting the standard signal generator circuit according to the rotational speed adjustment circuit.

■ Explanation of each part

1. B.F.G. METHOD (BACK ELECTROMOTIVE FORCE FREQUENCY GENERATOR)

Making use of the back electromotive force that is generated in the drive coil winding of the motor as a frequency generator, the frequency of the frequency generator is converted to the number of revolutions for the turntable.
After shaping the wave form of this back electromotive force, it is composed logically, and a frequency is generated that is proportional to the number of revolutions. This is the use of the B.F.G. Making use of the drive coil winding, frequency generator coil windings and magnets are not necessary, yielding a motor structure that is very compact.

2. FREQUENCY-VOLTAGE CONVERSION CIRCUIT

Being composed of a trapezoldal wave generating circult, a pulse generating circuit and a sampling integration circuit, the B.F.G. output frequency is converted to a voltage, and control output voltage is generated in order to maintain the rotational speed of the turntable at a constant level.

3. OPERATION CONTROL CIRCUIT

The operation control circuit functions as a control output voltage control keeping the rotational speed of the turntable constant with regard to the start of turntable operation and the operation of the mechanism. With this circuit, transient response characteristics and starting characteristics are very good.

4. OPERATIONAL AMPLIFIER (OP AMP) ACTIVE FILTER

Because of using an operational amplifier in the active filter, an ideal filter operation is possible.
As a result, such high performance as a signal-to-noise (SN) ratio of 60 dB (IEC-B) and a wow-and-flutter level of 0.03% (WRMS) have been achieved.

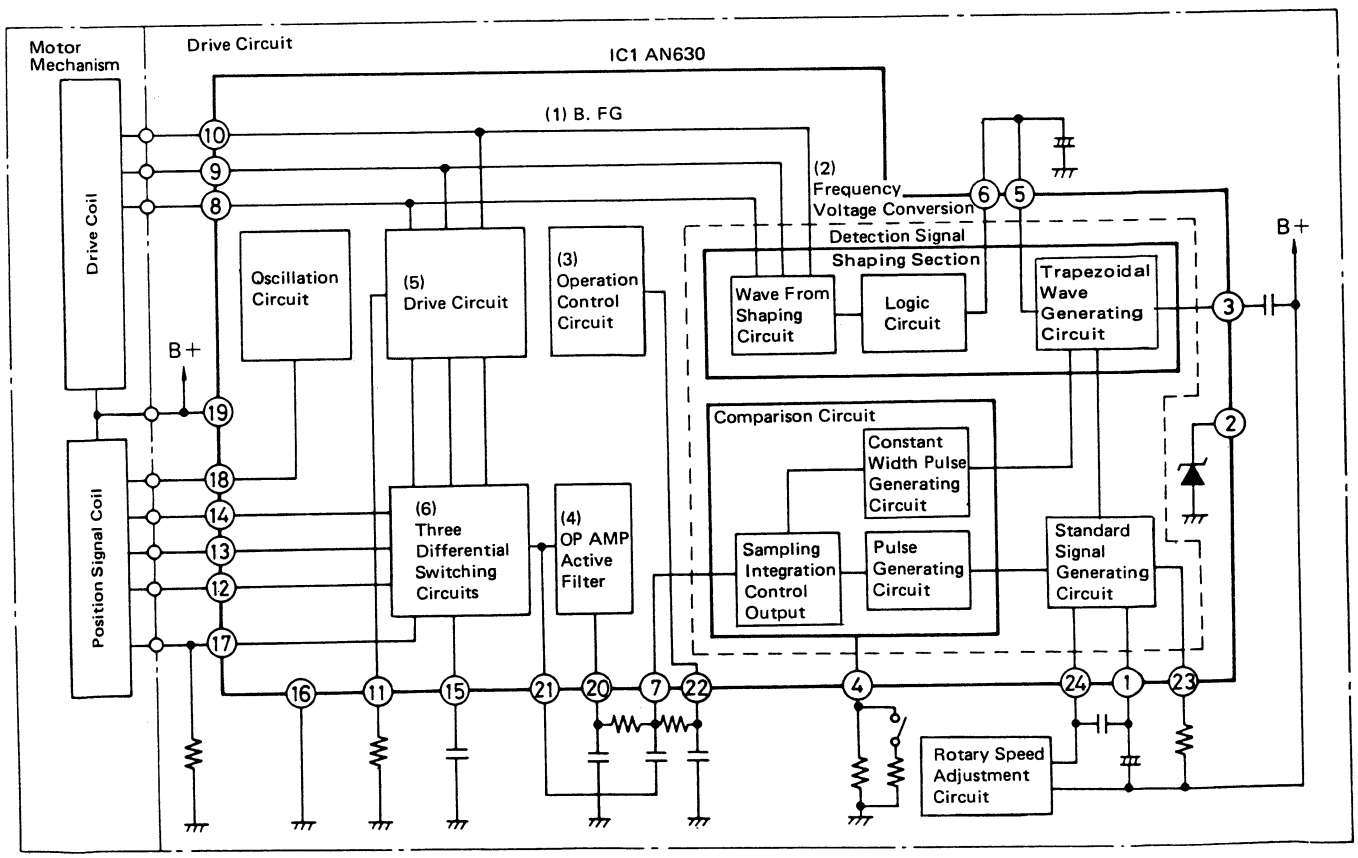
5. DRIVE CIRCUIT

By incorporating a large capacity power transistor in the integrated circuit, a starting torque of 1 kg-cm can be obtained. By means of this large starting torgue, prompt starts have been realized.

6. THREE DIFFERENTIAL SWITCHING CIRCUITS

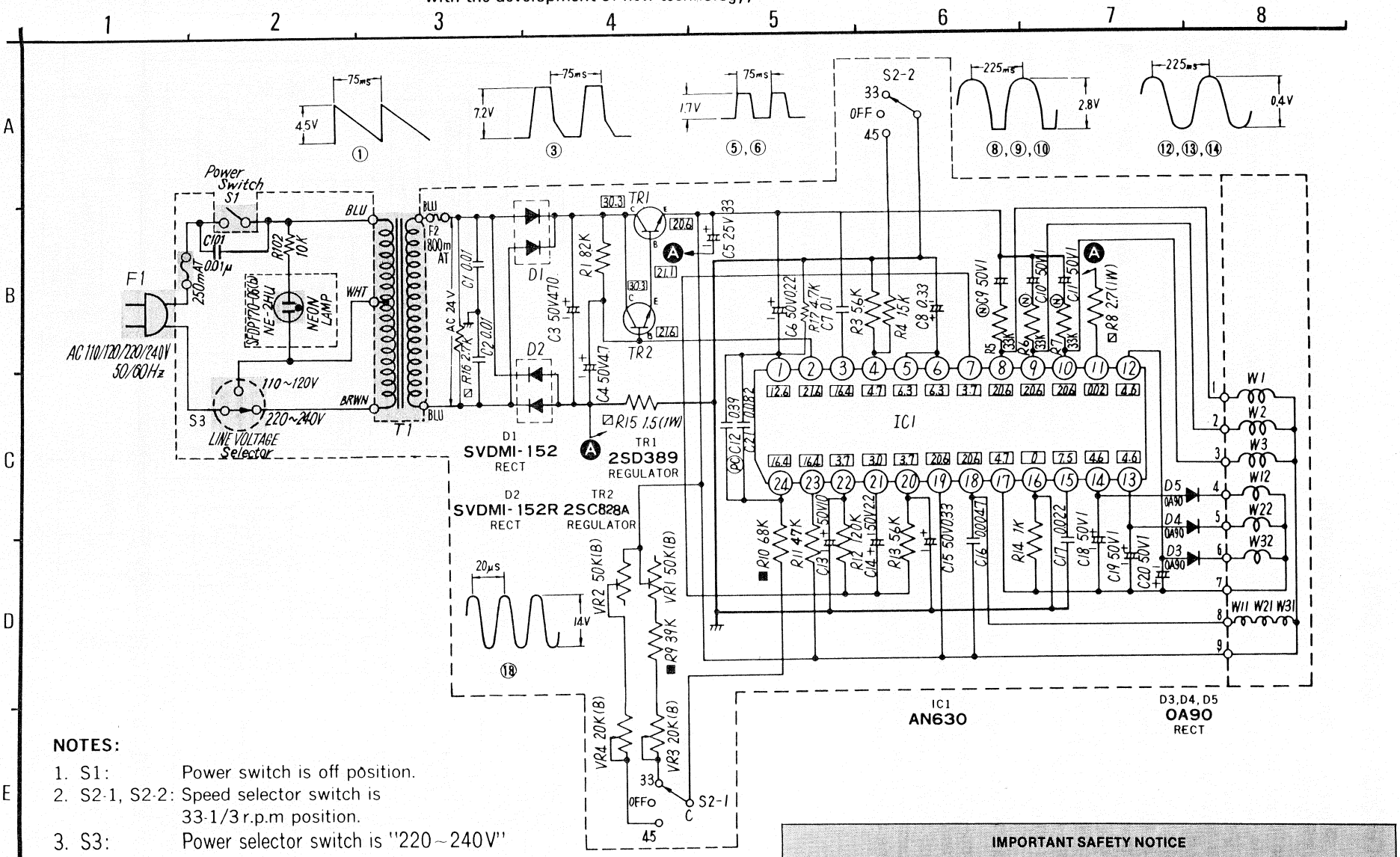
By means of the signal from the position signal coil, the starting circuit power transistor selector operates, obtaining smooth rotation.

■ Block diagram



■ Schematic Diagram

(This schematic diagram may be modified at any time with the development of new technology)



NOTES:

1. S1: Power switch is off position.
2. S2-1, S2-2: Speed selector switch is 33-1/3 r.p.m position.
3. S3: Power selector switch is "220~240V" position.
4. The voltage values entered are the values measured from the chassis with a standard tester that has an internal resistance of 100KΩ/V at a rotational speed of 33-1/3 r.p.m.

IMPORTANT SAFETY NOTICE

THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR SAFETY.
WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTUR'S SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

■ Circuit Board Wiring View

TR1 2SD389

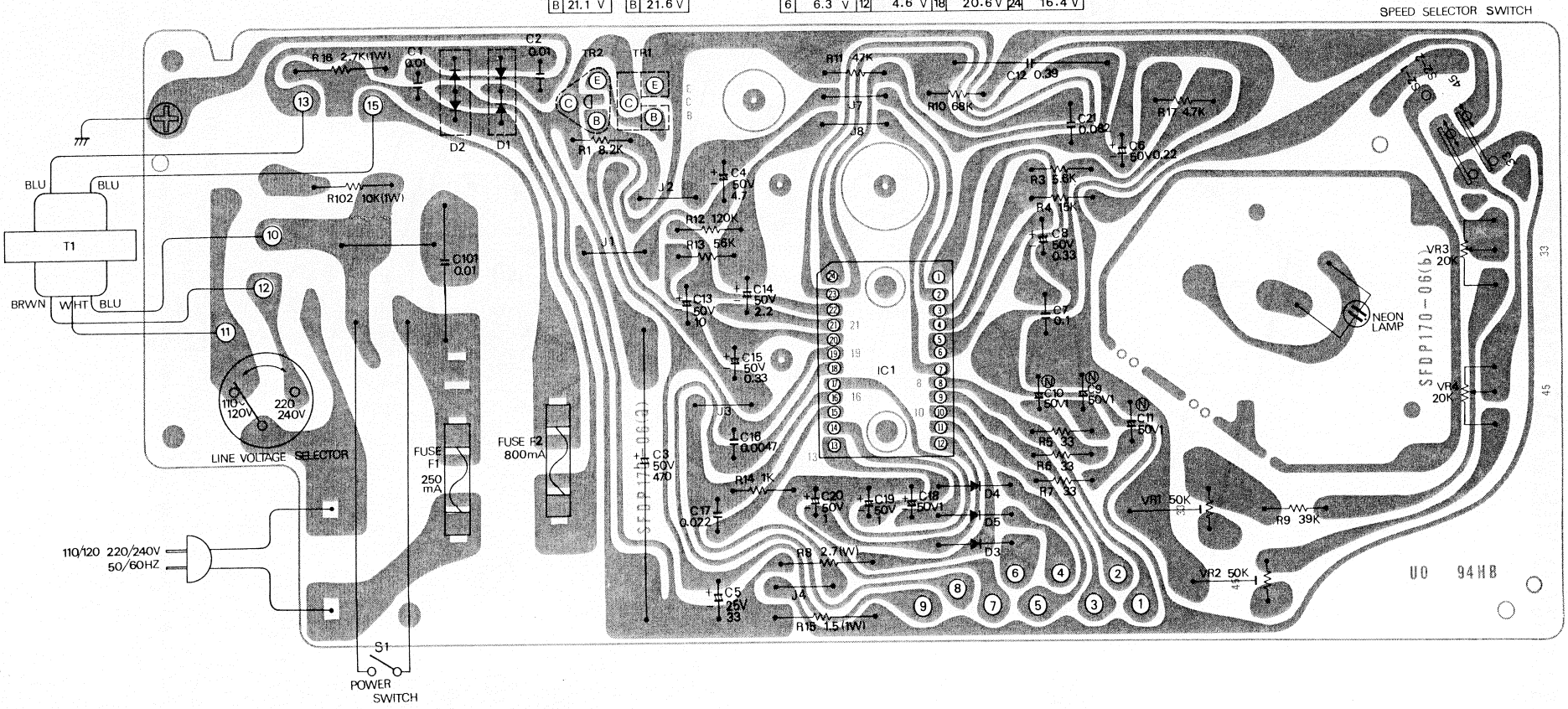
E	20.6V
C	30.3V
B	21.1 V

TR2 2SC828

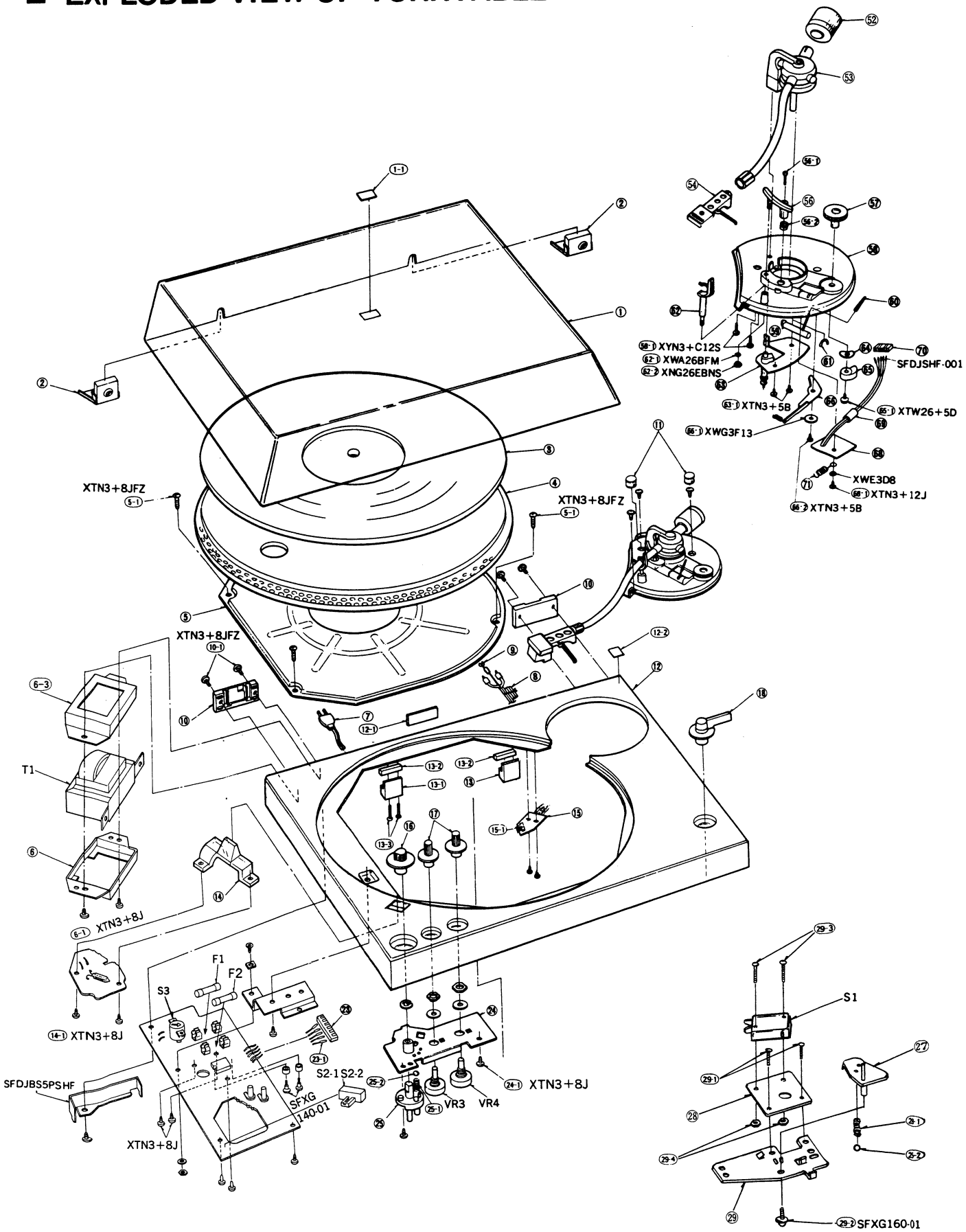
E	21.1 V
C	30.3 V
B	21.6 V

IC1 AN630

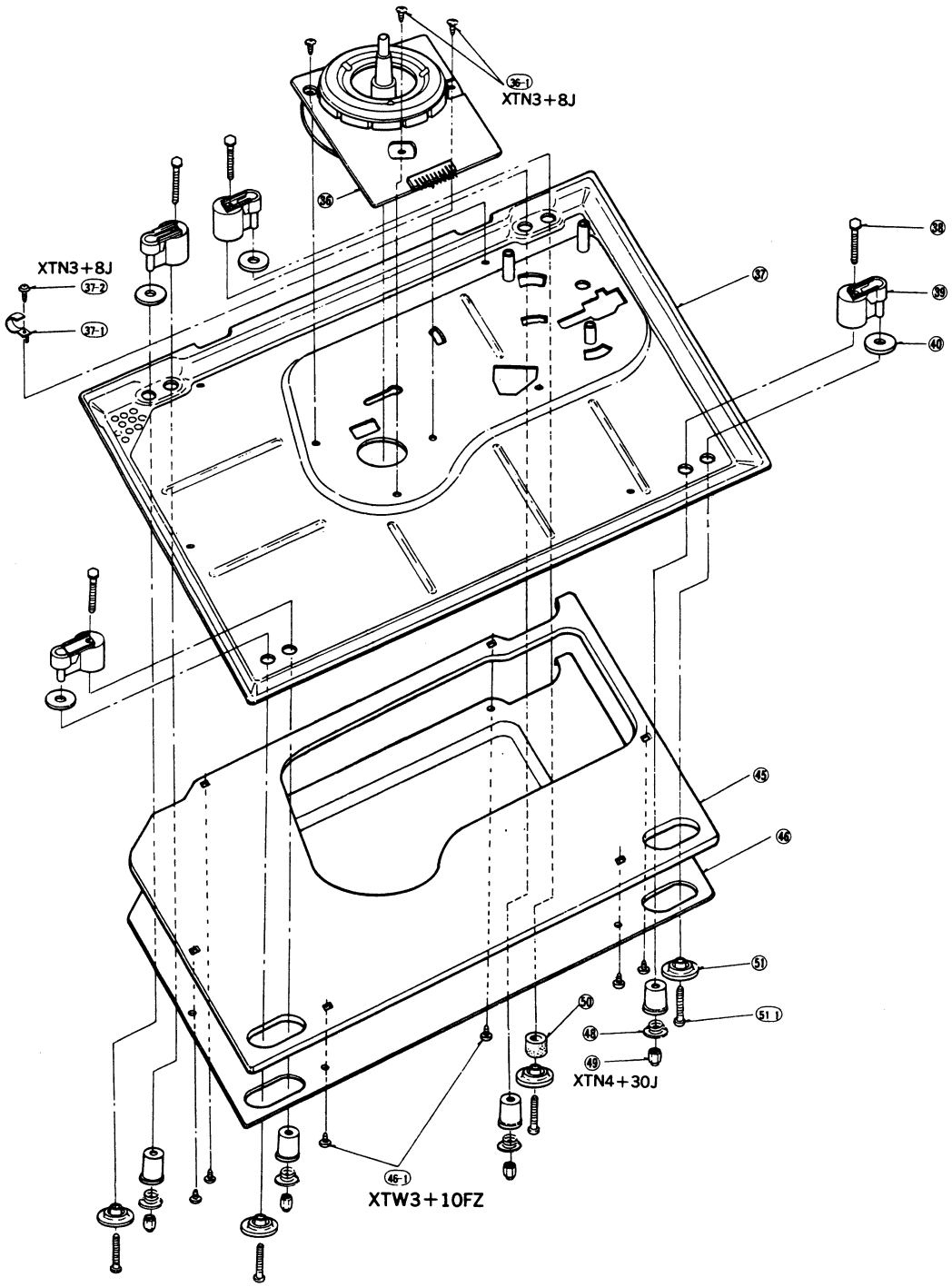
1	12.6 V	7	3.7 V	13	4.6 V	19	20.6 V
2	21.6 V	8	20.6 V	14	4.6 V	20	3.7 V
3	16.4 V	9	20.6 V	15	7.5 V	21	3 V
4	4.7 V	10	20.6 V	16	0 V	22	3.7 V
5	6.3 V	11	0.06 V	17	4.7 V	23	16.4 V
6	6.3 V	12	4.6 V	18	20.6 V	24	16.4 V



■ EXPLODED VIEW OF TURNTABLE



■ EXPLODED VIEW OF TURNTABLE



■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

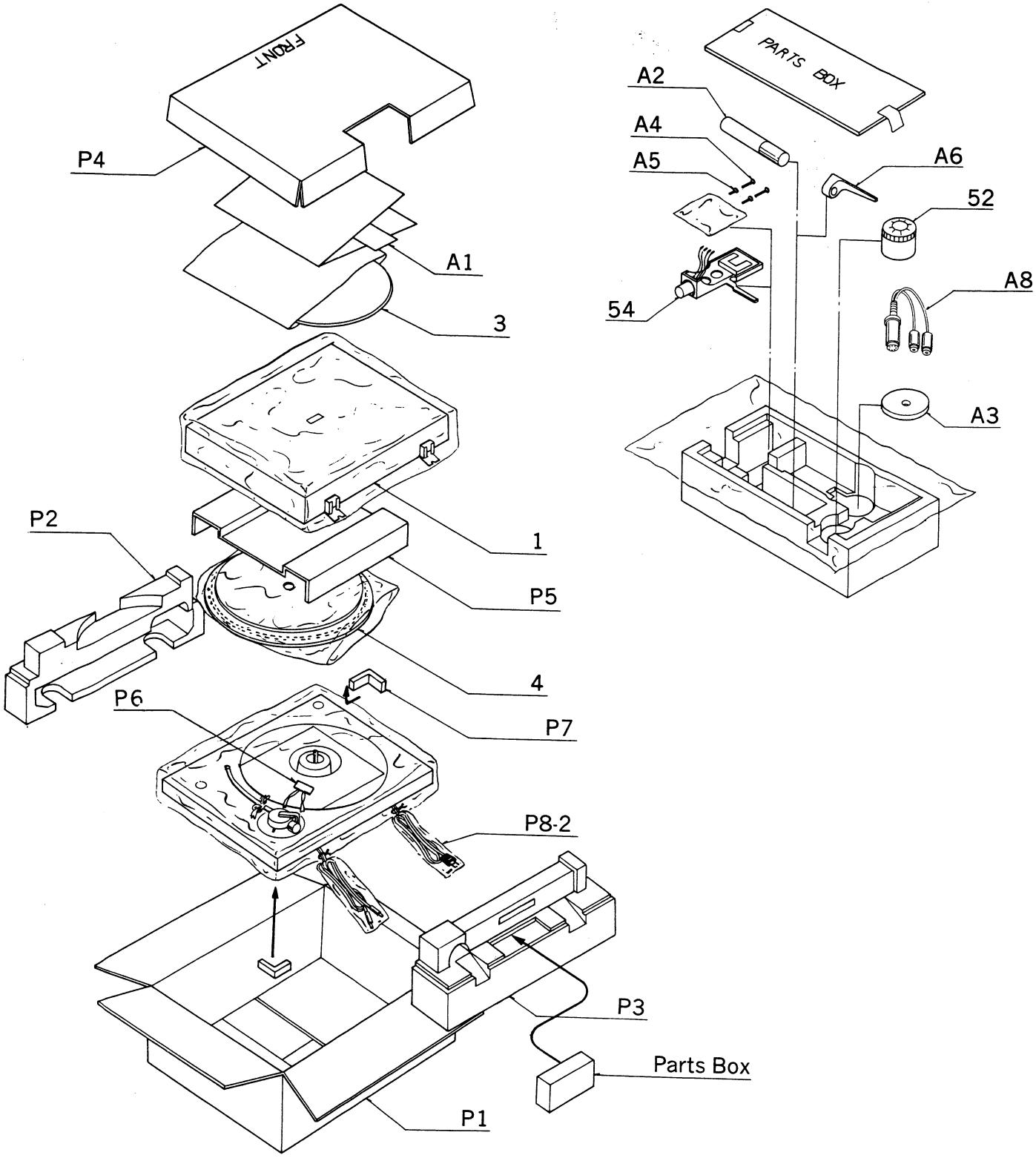
NOTE: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts order.
2. * The models [X, AX] are available in Asia, Latin America, Oceania, Middle East and Africa.
* The model [XAL] is available in Australia only.

Ref. No.	Part No.	Part Name & Description	Per set		Remarks
INTERGRATED CIRCUIT					
IC1	AN630	Intergrated circuit	1		
TRANSISTORS					
TR1	**2SD389A-Q**	Transistor	1		
TR2	**2SC1328-T**	Transistor	1		
DIODES					
D1	RVD10DC2	Diode	1		
D2	RVD10DC2R	Diode	1		
D3, 4, 5	OA90	Diodes	3		
TRANSFORMER					
T1	SLTMPT17A	Power transformer	1		
FUSES					
F1	XBA2C025TR0	250mA (Fuse)	1		
F2	XBA2C08TR0	800mA (Fuse)	1		
VARIABLE RESISTORS					
VR1, 2	EVLV3AS15B54	50kΩ, Pitch Controls	2		
VR3, 4	EVHGMAF15B24	20kΩ, Speed adjustment	2		
SWITCHES					
S1	SFDSAH76503	Micro switch, Power	1		
S2-1, S2-2	SFDS160-02	Speed selector switch	1		
S3	SFDSHXW13312	Power selector switch	1		
RESISTORS					
R1	**ERD25TJ822**	8.2kΩ, 1/4W, ± 5%, Carbon	1		
R3	**ERD25TJ562**	5.6kΩ, 1/4W, ± 5%, Carbon	1		
R4	**ERD25TJ153**	15kΩ, 1/4W, ± 5%, Carbon	1		
R5, 6, 7	**ERD25TJ330**	33Ω, 1/4W, ± 5%, Carbon	3		
R8	**ERX1ANJ2R7**	2.7Ω, 1W, ± 5 %, Metallic	1		
R9	ERO25CKF3902	39kΩ, 1/4W, ± 1%, Metallic	1		
R10	ERO25CKF6202	68kΩ, 1/4W, ± 1%, Metallic	1		
R11	**ERD25TJ473**	47kΩ, 1/4W, ± 5% Carbon	1		
R12	**ERD25TJ124**	120kΩ, 1/4W, ± 5%, Carbon	1		
R13	**ERD25TJ563**	56kΩ, 1/4W, ± 5%, Carbon	1		
R14	**ERD25TJ102**	1kΩ, 1/4W, ± 5%, Carbon	1		
R15	**ERX1ANJ1R5**	1.5Ω, 1W, ± 5%, Metallic	1		
R16	**ERG1ANJ272**	2.7kΩ, 1W, ± 5%, Metallic	1		
R17	**ERD25TJ472**	4.7kΩ, 1/4W, ± 5%, Carbon	1		
R102	**ERG1ANJ103**	10kΩ, 1W, ± 5%, Metallic	1		
CAPACITORS					
C1, 2	ECQM1H103KZ	0.01μF, 50WV, ±10%, Polyester	2		
C3	**ECEB50V470**	470μF, 50WV, −10~+50%, Electrolytic	1		
C4	**ECEA50M4R7**	4.7μF, 50WV, ±20%, Electrolytic	1		
C5	**ECEA25V33**	33μF, 25WV, −10~+50%, Electrolytic	1		
C6	**ECEA50ZR22**	0.22μF, 50WV, ±20%, Electrolytic	1		
C7	ECQM1H104KZ	0.1μF, 50WV, ±10%, PolyesterIII	1		
C8	**ECEA50ZR33**	0.33μF, 50WV, ±10%, Electrolytic	1		
C9, 10, 11	**ECEA50V1**	1μF, 50WV, ±10%, Electrolytic	3		
C12	ECQC2394KN	0.39μF, 200V, ±10%, Polyester	1		
C13	**ECEA50M10**	10μF, 50WV, ±20%, Electrolytic	1		
C14	**ECEA50M2R2R**	2.2μF, 50WV, ±20%, Electrolytic	1		
C15	**ECEA50MR33R**	0.33μF, 50WV, ±20%, Electrolytic	1		
C16	ECQM1H472KZ	0.0047μF, 50WV, ±10%, Polyester	1		
C17	ECQM1H223KZ	0.022μF, 50WV, ±10%, Polyester	1		
C18, 19, 20	**ECEA50V1**	1μF, 50WV, ±10%, Electrolytic	3		
C21	ECQM1H823KZ	0.082μF, 50WV, ±10%, Polyester	1		
C101 [X, AX]	ECQE2A103MZ	0.01μF, 250V, ±20%, Polyester	1		
C101 [XAL]	ECKDHS103SE	0.01μF, 400V, −20~ +50%, Ceramic	1		
CABINET and CHASSIS PARTS					
1	SFAD170-01E	Dust cover	1		
1-1	SFKK110	Badge, Dust cover	1		
2	SFAT170-01A	Hinge	2		
3	SFTG170-01	Turntable mat	1		
4	SFTE170-01A	Turntable	1		
5	SFAU170X01	Cover, Panel case	1		
5-1	XTN3+8JFZ	Screw	4		
6	SFUP170X01	Bracket, Power transformer	1		
6-1	XTN3+8J	Screw	2		
6-2	SFUP170X04	Insulating Plate	1		
6-3	SFUP170X02	Bracket B,Power Transformer	1		
7 [X, AX]	SFKP419C	AC Power cord	1		
7 [XAL]	SFEAKP550	AC Power cord	1		
8	SFDH028-01	Phono cord	1		
9	SFEL028-01E	Earth cord ass'y	1		
10	SFUM170-07	Case, Hinge	2		O
10-1	XTN3+8JFZ	Screw	4		
11	SFGK170-01	Rubber cap	2		
12	SFAC180X01	Player case	1		O
12-1	SFNN180X01	Name Plate	1		
13	SFUM170-11	Clamper B	1		
13-1 [X, AX]	SFUM170-11	Clamper A	1		
13-1 [XAL]	SFUM170L01	Clamper A	1		
13-2	SFUM170-06	Spacer, Cord	1		
13-3	XTW3+14FZ	Screw	4		
14	SFUM130-01	Neon lamp base	1		
14-1	XTN3+8J	Screw	2		
15	SFDP170-03	P.C.B. Phono cord	1		
15-1	SFDJBS5PSHF	Spacer, P.C.B.	1		
16	SFKT170-03E	Knob, Selector	1		
17	SFKT170-04E	Knob, Variable Pitch control	1		
18	SFKT170-01E	Knob, Start	1		
19	SJT347	Holder, Fuse	4		
20	SFDNE2HU	Neon	1		
23	SFDJ5047-09	Connector Pin	1		
23-1	SFDJ2759	Terminal	1		

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
24	SFUP170-01E	Bracket, Variable Pich control	1		
24-1	XTN3+16J	Screw	2		
25	SFUM170-03	Selector cam	1		
25-1	SFQA130-11	Spring	1		
25-2	SFYB5-32	Ball	1		
27	SFUM170-04	Start cam	1		
28	SFUM170-02	Cut Plate	1		
28-1	SFQH910-12	Spring	1		
28-2	**XUC3FT**	E-Shaped	1		
29	SFUP170-02E	Operating Plate ass'y	1		
29-1	XTN3+8J	Screw	2		
29-2	SFXG160-01	Spacer	1		
33-1	SFDJ2139-03	Connector Pin	1		
33-2	SFDJ2478	Terminal	2		
36	SFMZ170-01Z	Stater frame ass'y	1		
36-1	XTN3+8J	Screw	3		
37	SFUK180-01E	Main base ass'y	1		
37-1	SFUP170-08	Clamper, shield	1		
37-2	XTN3+8J	Screw	1		
38	XVG4C30	Nut	4		
39	SFUM170-10	Spacer, Main base	4		
40	SFUZ170-02	Rubber felt	4		
45	SFGZ170-02	Rubber, Main base	1		
46	SFAU170-01	Bottom board	1		
46-1	XTW3+10TFZ	Screw	6		
47	SFAG170-01	Rubber, Insulators	4		
48	SFQC170-01	Spring	4		
49	SFXG170-02E	Nut	4		
50	SFAU170-03	Spacer	1		
51	SFGA170-02A	Audio,Insulators	4		
51-1	XTN4+30J	Screw	4		
52	SFPWG15001K	Balance weight ass'y	1		
53	SFPAM17001K	Tone arm	1		
54	SFPCC13001K	Head shell	1		
55 [XAL, AX]	EPC270C2K-X	Cartridge	1		
55-1 [XAL, AX]	EPS270ED	Stylus	1		
55-2 [XAL, AX]	SFCZV7800	Screw	2		
56	SFPRT17003K	Arm lift	1		
56-1	SFXG829-1	Screw, Adjustment of arm lift base	1		
56-2	SFQA829-3	Spring, Arm lift	1		
57	SFPJK17001	Anti-Skating force control knob	1		
58	SFPKD17001	Arm base	1		
58-1	XYN3+C12S	Screw	2		
59	SFPJL17007K	Cueing level ass'y	1		
60	SFPAB12002	Knob, Cueing Lever	1		
61	SFPGM20001	Cueing rubber	1		
62	SFPRT17001K	Arm rest	1		
62-1	XWA26BFM	Washer	1		
62-2	XNG26EBNS	Nut	1		
63	SFPAB17001A	Arm lift base ass'y	1		
63-1	XTN3+5B	Screw	2		
65	SFPJK17002	Canceler cam A	1		
65-1	XTW26+5D	Screw	1		
66	SFPSH17001	Canceler cam B	1		
66-1	XWG3F13	Washer	1		
66-2	XTN3+5B	Screw	1		
68	SFDP170-04	Terminal strip, Phono cord	1		
68-1	XTN3+12J	Screw	1		
69	SFGT829T02	Tube	1		
70	SFDJS5PSHF1	Connector	1		
71	SFPSP17003	Spring	1		

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
ACCESSORY PARTS					
A1	SFNU180X01	Instruction Book	1		O
A2	SFWO010	Oil	1		
A3	SFWE154A1	45 r.p.m. adaptor	1		
A4 [X]	SFPEV7800	Screw, Cartridge	2		
A5 [X]	SFCZV8800	Screw, Cartridge	2		
A6 [X]	SFKO135X01E	Overhang gauge	1		
A7	SFDK100G	DIN-PIN adaptor	1		
A8 [X, AX]	SFDKI19118	2-PIN Plug	1		
PACKING MATERIALS					
P1 [X, XAL]	SFHP180X01	Packing case	1		O
P1 [AX]	SFHP180B01	Packing case	1		O
P2	SFHH170-01	Side Pad (Front)	1		
P3	SFHH170-02	Side Pad (Rear)	1		
P4	SFHD170-01	Top Pad	1		
P5	SFHD170-02	Pad, Turntable	1		
P6	SFHS170-02	Spacer, Arm base	1		
P7	SFHS170-01	Spacer, Panel	2		
P8 [X]	SFHP180X02	Packing case (Outer)	1		O
P8 [AX]	SFHP180B02	Packing case (Outer)	1		O

■ PACKING PARTS



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